

WHAT IS CLAIMED IS:

1. A lithographic apparatus including an illumination system for providing a conditioned beam of radiation, the illumination system comprising:
a reflective integrator disposed along an optical axis of the lithographic apparatus, the reflective integrator having a rectangular cross-section perpendicular to said optical axis, the cross-section having sides parallel to mutually perpendicular X and Y axes; and
an optical element, constructed and arranged to redistribute an intensity distribution exiting the reflective integrator such that the intensity distribution is asymmetric with respect to at least one of the X and Y axes.
2. A lithographic apparatus according to claim 1, wherein said optical element is constructed and arranged to rotate an intensity distribution of a beam of radiation around said optical axis over an angle between 5 and 85 degrees.
3. A lithographic apparatus according to claim 2, wherein said angle is $90/n$ degrees where n is an integer number in a range from 2 to 18.
4. A lithographic apparatus according to claim 1, wherein said optical element is disposed downstream of said reflective integrator in a pupil plane of said illumination system.
5. A lithographic apparatus according to claim 4, wherein said optical element includes at least one pair of reflective surfaces, said pair of reflective surfaces constructed and arranged to reallocate part of the intensity distribution of said beam.
6. A lithographic apparatus according to claim 5, wherein a distance between the optical axis and said part of the intensity distribution upstream of said optical element is equal to said distance downstream of said optical element.
7. A lithographic apparatus according to claim 5, wherein said reflective surfaces include coated mirrors.

8. A lithographic apparatus according to claim 5, wherein said at least one pair of reflective surfaces are planar and parallel to each other so that a direction of a ray of said beam of radiation upstream of said optical element equals a direction of said ray downstream of said optical element.
9. A lithographic apparatus according to claim 5, wherein the optical element includes two pairs of reflective surfaces, each pair of reflective surfaces constructed and arranged to reallocate one of two respective poles of said intensity distribution.
10. A lithographic apparatus according to claim 5, wherein said optical element includes a plurality of pairs of reflective surfaces constructed and arranged to rotate substantially a whole intensity distribution of said beam of radiation.
11. A lithographic apparatus according to claim 10, wherein said plurality of pairs of reflective surfaces includes radially extending and tilted mirror blades, the mirror blades including a reflective coating at both sides.
12. A lithographic apparatus according to claim 11, wherein a thickness of said mirror blades varies as a function of distance from the optical axis and as a function of angle around the optical axis.
13. An illumination system including:
 - a reflective integrator disposed along an optical axis, the reflective integrator having a rectangular cross-section perpendicular to said optical axis, the cross-section having sides parallel to mutually perpendicular X and Y axes; and
 - an optical element, constructed and arranged to redistribute an intensity distribution exiting the reflective integrator such that the intensity distribution is asymmetric with respect to at least one of the X and Y axes.
14. An optical element constructed and arranged to rotate an intensity distribution of a beam of radiation over an angle between 5 and 85 degrees.

15. An optical element according to claim 14, wherein said angle is variable and the optical element is set according to the value of said angle.

16. A lithographic apparatus comprising:

- an illumination system for providing a projection beam of radiation;
- a support structure for supporting a patterning device, the patterning device serving to impart the projection beam with a pattern of its cross-section;
- a substrate table for holding a substrate;
- a projection system for projecting the patterned beam onto a target portion of the substrate;

- wherein the illumination system comprising:

- a reflective integrator disposed along an optical axis of the lithographic apparatus, the reflective integrator having a rectangular cross-section perpendicular to said optical axis, the cross-section having sides parallel to mutually perpendicular X and Y axes; and

- an optical element, constructed and arranged to redistribute an intensity distribution exiting the reflective integrator such that the intensity distribution is asymmetric with respect to at least one of the X and Y axes.